

Technical specifications

General information

Ex motors in vertical type of construction with shaft extension pointing down must have a protective cover (position 14 of Article No.: **G**).

Detailed Operating Instructions (Compact) are supplied as standard with explosion-proof motors as hard copies in English and German. Translations are also available in all the other official EU languages as well as in Russian and Chinese.

For all explosion-proof motors, designs according to UL (order code **D31**) and CSA (order code **D40**) are not possible.

Motor connection

For 1MM1, 1MH1, 1MQ1 and 1MN1 motors in the explosion-proof design, the cable entry plate is supplied undrilled as standard. This enables you to adapt the number and size of the holes to the installation conditions. The cable entry can be rotated by 180°.

1MH1 motors for line operation in conjunction with order code **D36** (statement of conformity) and/or **D37** (IEC Ex certificate) is replaced by the GT 640 terminal box assigned in tables 6/22 ff by the terminal box 1XB1621.

The certificates for the motors for hazardous areas are stored with the documentation in the Drive Technology Configurator (DT Configurator).

Certified motor protection switches/tripping units must always be used for motor protection, [see Catalog IC 10](#).

When metal armored cables are routed into the auxiliary terminal boxes, the metal shield must only be grounded once: either in the auxiliary terminal box or in the control room of the operator.

In the case of SIMOTICS FD motors 1MM1, 1MH1, 1MQ1 and 1MN1, monitoring of the bearing temperature is only mandatory for Zone 22 (order code **A72**).

Type of protection Ex nA for use in Zone 2

- Design for Zone 2 for line operation (order code **M72**)
- Version for Zone 2 for converter operation (order code **M73**)

1MM1, 1MH1, 1MQ1¹⁾ and 1MN1 motors are modified for this purpose in the "Non-sparking" design and are suitable for use in hazardous areas of Zone 2 for temperature classes T1 to T3. The maximum surface temperature that can occur during operation is below the limit temperature of the respective temperature class. The ventilation system complies with IEC/EN 60079-0/-15/-31. The motors are equipped with an external grounding terminal. The terminal box is designed for Ex e type of protection.

Ambient temperature -0 to +60 °C, whereby derating applies from 40 °C upwards. Other temperatures are available on request.

The rating plate or the additional rating plate contains the text:

 II 3G Ex nA IIC T3

Type of protection Ex tc for use in Zone 22

Ex tc in accordance with IEC/EN 60079-31 for Zone 22 with non-conductive dust (IP55)

- Version for Zone 22 for line operation (order code **M35**)
- Version for Zone 22 for converter operation (order code **M39**)

1MM1, 1MH1, 1MQ1 and 1MN1 motors are modified for this purpose for use in zones subject to dust and explosion hazards. The surface temperature is ≤125 °C for rated operation.

The motors are equipped with an external grounding terminal.

Certification:

- Zone 22: EC Declaration of Conformity, conformity declaration IECEx Certificate of Conformity

Identification on the rating plate (additional rating plate for SIMOTICS FD motors):

- Zone 22:  II 3D Ex tc IIIB T125 °C

Ambient temperature -0 to +60 °C, whereby derating applies from 40 °C upwards. Other temperatures are available on request.

This version can be ordered with the note "Operation in Zone 2 or Zone 22".

¹⁾ 1MQ1 motors are only certified for explosion group/explosion subgroup IIB.

Explosion-proof motors

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Technical specifications (continued)

Converter (1MM1, 1MH1, 1MQ1, 1MN1) or line operation (1LH1)

With converter operation, the torque reduction factors must be configured according to the table in the section "Derating". The torque reduction factors for constant torque drives will be configured, on request, on specification of the speed control range and the required torque.

For converter operation, Ex motors must always be monitored using PTC thermistors. Certified tripping units are required for this purpose, see [Catalog IC 10](#).

Explosion-proof motors 1MM1, 1MH1, 1MQ1 and 1MN1

The motors of the 1MM1, 1MH1, 1MQ1 and 1MN1 series are available in Ex nA (Zone 2) or Ex tc (Zone 22) types of protection. The motors have PTC thermistors for alarm and tripping in accordance with thermal class 155 (F),

Ambient temperatures are possible in the range from -20 up to +60 °C, whereby above +40 °C, additional power derating applies. An inquiry is required for different ambient temperatures.

External metal fans are used as standard with 1MM1 motors. The following motors are equipped as standard with a unidirectional external metal fan:

- 1MM1...-3BB...-1...
- 1MM1...-4A...-....
- 1MM1...-4B...-....

When ordering these motors, order code **K37** must be specified for clockwise rotation or order code **K38** for counterclockwise rotation.

An EC Declaration of Conformity is enclosed with every motor. In the case of motors for converter operation, the following information must be supplied in the order or inquiry in plain text:

- For a constant torque drive (order code **B61**: $T = \text{const.}$) or drives for fans, pumps and compressors (order code **B60**: $T \sim n^2$)
- Load torque
- Speed control range
- Utilized thermal class that the motor should or must comply with

Note:

Motors of the 1L.1 series (non-Ex motors) are utilized in accordance with thermal class 180 (H)/155 (F). Derating of motors of the 1M.1 series (Ex motors) results in a corresponding reduction in thermal utilization.

These specifications regarding operation are labelled on an additional rating plate on the motor (see also section "Additional rating plate" under "Rating plate labeling" on page 10/7).

Type of protection Ex nA for use in Zone 2

The motors are modified for operation in Zone 2 and designed for compliance with temperature class T3 (maximum surface temperature of 200 °C inside the motor).

- Design for Zone 2 for line operation – order code **M72**:
Standard utilization in accordance with thermal class 130 (B). Utilization in accordance with thermal class 155 (F) with service factor (order code **C14**) possible on request.
- Version for Zone 2 for converter operation – order code **M73**:

Depending on the power derating, the standard utilization lies between thermal Class 130 (B) and 155 (F). In constant torque drives (order code **B61**: $T = \text{const.}$) the thermal utilization depends on the value of the load torque and the speed control range ($\rightarrow$ 130 (B) and/or 155 (F)). The maximum possible constant torque is dependent on the speed control range and the cooling method of the motor $\rightarrow$ thermal torque limit characteristic.

IEC/EN 60079-15 specifies that the motor and converter must be tested as a unit. As an alternative, however, it is also admissible for the thermal response to be determined by a calculation. The thermal response of the motors for operation on Siemens converters is known, so a system test is not generally required for drives for fans, pumps and compressors. Please inquire as to whether a system test is necessary or not in the case of a constant torque drive $\rightarrow$ constant torque drives on request only.

The following identification is included on an additional rating plate on the motor:

II 3G Ex nA IIC T3 Gc, IEC/EN 60079

Type of protection Ex tc for use in Zone 22 for non-conductive dust

The motors are modified for operation in Zone 22 and designed such that an external motor surface temperature of 125 °C is not exceeded.

For the 1MM1, 1MH1, 1MQ1¹⁾ and 1MN1 motor series, monitoring of the bearing temperature is required for operation in Zone 22. These motors are therefore equipped with bearing temperature sensors as standard.

- Version for Zone 22 for line operation – order code **M35**:
Standard utilization in accordance with thermal class 130 (B). Utilization in accordance with thermal class 155 (F) with service factor (order code **C14**) possible on request.
- Version for Zone 22 for converter operation – order code **M39**:
Depending on the power derating, the standard utilization lies between thermal Class 130 (B) and 155 (F). In constant torque drives (order code **B61**: $T = \text{const.}$) the thermal utilization depends on the value of the load torque and the speed control range ($\rightarrow$ 130 (B) and/or 155 (F)). The maximum possible constant torque is dependent on the speed control range and the cooling method of the motor $\rightarrow$ thermal torque limit characteristic. When configuring these motors, therefore, it is important to note that the maximum admissible torque, as a function of speed, is not exceeded. Please inquire as to whether a system test is necessary or not in the case of a constant torque drive $\rightarrow$ constant torque drives on request only.

The following identification is included on an additional rating plate on the motor:

II 3D Ex tc IIIB T125 °C Dc, IEC/EN 60079

Operation on non-Siemens converter

It is normally necessary to inquire regarding operation of the motors on a non-Siemens converter, regardless of the type of protection and torque characteristic of the driven machine. A test must be performed to ensure that the temperature limits are complied with. This should take place at the customer's premises (not possible in the factory).

¹⁾ 1MQ1 motors are only certified for explosion group/explosion subgroup IIB.

Technical specifications (continued)

Derating

In comparison to non-Ex motors, the rated power of Ex motors is reduced. Derating is performed in accordance with defined factors. The reference power here is the rated power of the non-Ex motor.

Derating factors for motors of the 1M.1 series

Motor type	Zone (order code)					
	Zone 2 (M72)		Zone 2 (M73)		Zone 22 (M35)	
	Torque (order code)					
	$T \sim n^2$ (B60)	$T \sim n^2$ (B60)	$T = \text{const.}$ (B61)	$T \sim n^2$ (B60)	$T \sim n^2$ (B60)	$T = \text{const.}$ (B61)
1MM1	–	0.9	O.R.	–	0.8	O.R.
1MQ1	–	0.9	O.R.	–	0.8	O.R.
1MH1	1	0.9	O.R.	1	0.9	O.R.
1MN1	–	0.9	O.R.	–	1	O.R.

O.R. On request

Rating plate labeling

Rating plate

In contrast to the non-Ex motor, the rating plate specifies that the voltage tolerance is compliant with IEC/EN 60034-1, Zone A.

SIEMENS									
3~ Mot. 1MM1 222-3AB71-2AA0-Z SIMOTICS FD NoN- 9900006060001 / 2014									
m: 1.8 t IP 55 IM B3 Ta: -20...+40°C Th.Cl.: 180(H) Util.:155(F)									
nmax: 2500 1/min IEC/EN 60034-1									
U [V]	I [A]	P [kW]	cosφ	n [1/min]	f [Hz]		Eff.		
380 Δ)	580	320	0.87	1500	50.30)		96.2%		
Mot. design: ONLY FOR SINAMICS WITH OPT. PULSE PATTERNS (p1802=19)									
Line supply: 400V/50Hz									
*) VARIATIONS ACC. TO IEC/EN 60034-1, ZONE A									
Made in Germany D-90441 Nürnberg									

Valid for:

Order code **M72**: Zone 2 for line motors

Order code **M73**: Zone 2 for converter motors

Order code **M35**: Zone 22 for line motors

Order code **M39**: Zone 22 for converter motors

If, in addition to order codes **M72**, **M73**, **M35** or **M39**, order code **D36** (conformity statement) and/or **D37** (IEC Ex certificate) is also specified in the order, the corresponding certificate numbers will be stamped on the rating plate.

Additional rating plate

The Ex motors have an additional rating plate containing additional information as required by standard EN 60079-0 with regard to converter operation.

- Speed or frequency control range, e.g. 150 ... 1500 rpm
- Torque characteristics and max. torque, e.g.
 $T \sim n^2$, $T_{\max} = 2037 \text{ Nm}$
- Converter type, e.g. SINAMICS
- Min. pulse frequency, e.g. 1250 Hz

Valid for:

Order code **M73**: Zone 2 for converter motors

Order code **M39**: Zone 22 for converter motors

Order code **B60**: $T \sim n^2$

If, in addition to order codes **M72**, **M73**, **M35** or **M39**, order code **D36** (conformity statement) and/or **D37** (IEC Ex certificate) is also specified in the order, the corresponding certificate numbers will be stamped on the rating plate.

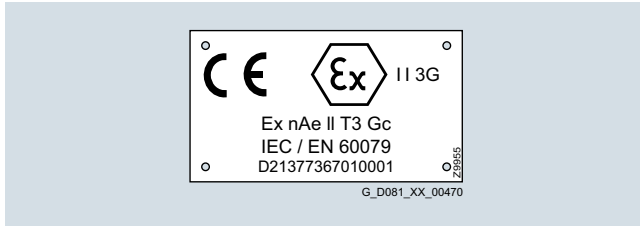
Explosion-proof motors

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Technical specifications (continued)

Ex plate

Zone 2:



Note:

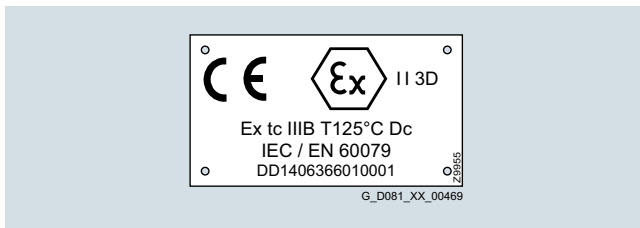
The letter(s) between "Ex nA" and "II T3 Gc" vary according to the additional components of the motor (e.g. temperature sensor, anti-condensation heating, etc.).

Valid for:

Order code **M72**: Zone 2 for line motors

Order code **M73**: Zone 2 for converter motors

Zone 22:



Valid for:

Order code **M35**: Zone 22 for line motors

Order code **M39**: Zone 22 for converter motors

VIK version

The recommendations of the VIK (Verband der Industriellen Energie und Kraftwirtschaft e. V.) describe the requirements for three-phase induction motors as often required by the chemical industry:

VIK standard version:

1L 1 + order code **K30** – "VIK" marking on the rating plate

VIK Ex n version:

1M 1 + order code **K30** – "VIK" marking on rating plate;
"Ex nA IIC T3 Gc" on an additional rating plate in accordance with Directive 2014/34/EU

Both motor versions include the technology for Zone 2 in "Non-sparking" type of protection. In accordance with the technical requirements of VIK, motors can be supplied in frame sizes 315, 355, 400 and 450.

Coolant temperature

Coolant temperature -40 to +40 °C for explosion-proof motor

For all 1MM1, 1MH1, 1MQ1¹⁾ and 1MN1 motors in explosion protection types Ex nA or Ex tc (Zone 2/22), the operating ambient temperature range can be optionally extended to -40°C. Extensive technical measures are necessary in this case.

Special mounting technology

"Special mounting technology" comprises technology that is compatible with explosion-proof motors.

Explosion-proof motors can be implemented in a broader range of applications when explosion-proof rotary pulse encoders or explosion-proof separately driven fans are mounted.

The use of a separately driven fan is recommended to increase motor utilization at low speeds and to limit noise generation at speeds significantly higher than the synchronous speed.

1MQ1 and 1MN1 motors are optionally available with a declaration of conformity according to 2014/34/EU issued by an independent testing body for Zone 2 motors (Ex nA) (order code **D36**)²⁾. For 1MQ1 motors, the paint color of the separately driven fan is always black. An IEC Ex certificate (order code **D37**) is not available for 1MQ1 and 1MN1 motors.

Explosion-proof rotary pulse encoder

The rotary pulse encoder can only be mounted on a standard non-drive end (NDE), i.e. a second shaft extension or protective cover cannot be supplied. In the case of a vertical mounting position for motors of the 1MM1 series, therefore, a suitable driven fan is always implemented by the customer to prevent small parts from falling into the fan cover (see also standard IEC/EN 60079-0).

The type of protection of the rotary pulse encoder must be observed. The relevant data are stamped on the rating plate of the rotary pulse encoder.

When an explosion-proof rotary pulse encoder is mounted, the length of the motor increases by dimension I. For an explanation of the additional dimensions and weights, see "Dimensions and weights of explosion-proof rotary pulse encoders" on the website of the encoder manufacturer.

HOG 10 and HOG 11 rotary pulse encoders

The HOG 10 and HOG 11 rotary pulse encoders have an extremely rugged design and are therefore ideally suited to difficult operating conditions.

The following order codes are available for explosion-proof rotary pulse encoders (ATEX):

- **H73**: HOG 10 D 1024 I
- **H83**: HOG 10 DN 2048
- **H88**: HOG 11 DN 1024 I (16 mm) special corrosion protection

Encoder mounting for use below -20 °C and above +40 °C is available on request.

Please consult the manufacturer's website for further information and technical data of the encoders.

Manufacturers of rotary pulse encoders

Types: HOG 10, HOG 11:

Baumer Hübner GmbH
Max-Dohrn-Str. 2+4

10589 Berlin, Germany
Tel. +49 30 6 90 03-0

Fax +49 30 6 90 03-1 04

www.baumerhuebner.com

E-mail: info@baumerhuebner.com

¹⁾ 1MQ1 motors are only certified for explosion group/explosion subgroup IIB.

²⁾ For 1MQ1 motors, frame size 315, an axially mounted separately driven fan (16th position of the Article No. = 1) is not available.